Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, DC 20554

In the Matter of	)	
	)	
Utilizing Rapidly Deployable Aerial Communications Architecture in Response to an Emergency	)	PS Docket No. 11-15

REPLY COMMENTS OF
CTIA–THE WIRELESS ASSOCIATION®

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I. SUMMARY AND INTRODUCTION

CTIA–The Wireless Association® ("CTIA") respectfully replies to comments submitted in response to the Federal Communications Commission's ("FCC" or "Commission") Notice of Inquiry ("*NOI*") regarding the deployment of aerial communications architecture ("DACA") to provide immediate communications in the aftermath of disasters.[1] The comment record reflects three main points:

- Both public safety interests and commercial mobile providers continue to express significant concerns about the impact to first responders and consumers regarding the interference risks associated with a temporary deployment of aerial transmissions on licensed spectrum in the aftermath of disasters.

- DACA proponents largely ignore the *NOI*'s key questions regarding interference from DACA operations to terrestrial networks' ongoing operations or restoration efforts; when they do comment, the DACA proponents fail to provide sufficient technical specificity or a meaningful roadmap for how an overlay aerial network would avoid interference to consumers using terrestrial services that have been maintained through a disaster and/or are being restored.

- Commenters largely recognize that any further consideration of DACA deployments should focus on supplementing public safety networks, not commercial mobile services.

[1] *Utilizing Rapidly Deployable Aerial Communications Architecture in Response to an Emergency*, Notice of Inquiry, PS Docket No. 11-15, FCC 12-53 (rel. May 24, 2012) ("*NOI*").

The fundamental concerns CTIA and others have identified since the Commission issued its DACA *Public Notice* 18 months ago remain unresolved.[2] Accordingly, the Commission should abandon any further exploration of temporary DACA deployment. If the Commission does proceed, any further consideration of DACA deployments should focus on supplementing public safety networks, not commercial mobile services.

II. PUBLIC SAFETY AND COMMERCIAL MOBILE LICENSEES SHARE INTERFERENCE CONCERNS ABOUT DACA OPERATION ON LICENSED SPECTRUM

The record demonstrates that both public safety interests and commercial mobile licensees have significant concerns regarding the interference to wireless users that may result from a DACA deployment. In the aftermath of a disaster, these licensees work tirelessly to maintain communications services and, in the event that networks are disrupted, to restore service. By any definition, these communications – both public safety operators providing service for first responders and commercial operators providing service for consumers to reach 9-1-1 or loved ones – are critical.

With respect to DACA use of public safety spectrum, APCO cites the "potential for dangerous interference" and urges that any use of DACA "should be the last resort and used only when existing networks are inoperable and no other means of restoration is immediately available."[3] Commercial mobile licensees raise similar concerns. As Sprint observes:

> If network coverage were simply a matter of having the ground-based network either "on" or "off," DACA deployment might prove more feasible than it actually is. However, most network outages do not result in binary conditions where the

[2] *Public Safety and Homeland Security Bureau Seeks Comment on Rapidly Deployable Aerial Telecommunications Architecture Capable of Providing Immediate Communications to Disaster Areas*, Public Notice, PS Docket No. 11-15, 26 FCC Rcd 666 (PSHSB rel. Jan. 28, 2011) ("*Public Notice*").

[3] Comments of APCO at 1-2 (filed July 25, 2012) ("APCO Comments").

> network is either functioning or not functioning, but rather create a Rorschach pattern of "dark," "light" and "gray" areas …. The "inkblot" of terrestrial coverage that follows an outage can also change rapidly both as unaffected base stations increase power to try to replace lost coverage and as the network recovery efforts get underway.[4]

The Commission must take into account these concerns of licensees that are actually operating the networks and providing service in the aftermath of disasters.

Further, both public safety and commercial interests identified significant challenges to any coordination regime intended to facilitate aerial operations while existing services seek to maintain or reconstitute operations. As APCO noted, "[f]requency coordination of aerial telecommunications would require a complete set of factors," and any DACA operation should be limited only to "existing designated public safety interoperability (a.k.a. mutual aid) channels."[5] With respect to an aerial network overlay using frequencies in use by a terrestrial network or soon to be restored, AT&T raises even stronger concerns:

> No amount of coordination would allow two separate networks – a commercial terrestrial network and an airborne network – using the same frequencies to operate in tandem over the same geographic area without interference and in a manner that would allow for the reliable communications that would be needed and expected following a disaster event.[6]

In sum, licensees have demonstrated that there are considerable concerns regarding interference from DACA operations in licensed frequencies and significant obstacles to coordinating sufficiently to conduct such operations in the aftermath of a disaster. As described further below, the comments of the DACA proponents fail to mitigate these objections.

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[4] Comments of Sprint Nextel at 5-6 (filed July 25, 2012) ("Sprint Comments").

[5] APCO Comments at 3

[6] Comments of AT&T at 5 (filed July 25, 2012) ("AT&T Comments").

III. DACA PROPONENTS FAIL TO ALLEVIATE INTERFERENCE AND OTHER CONCERNS

At the *Public Notice* stage, CTIA and others noted that the temporary deployment of aerial transmissions on spectrum licensed for other purposes risks harming ongoing operations or restoration efforts.[7] The record, however, offers no meaningful input on how to superimpose DACA deployments on licensed spectrum without disrupting network restoration and business continuity efforts. As such, the Commission must ensure that, at a minimum, any DACA operations obtain express licensee approval. Nor does the record resolve serious questions regarding DACA efficiency. As discussed below, DACA proponents – primarily vendors of DACA infrastructure – fail to tackle these serious concerns.

A. Interference Management and Frequency Coordination Questions Remain Unanswered

No DACA proponent offers an operational description or sufficient specificity as to how an aerial solution could overlay a terrestrial network in the aftermath of disaster and avoid interference to the underlying licensee's ongoing (albeit possibly limited) operations and restoration efforts. Instead, DACA proponents sweepingly proclaim that unproven technologies will solve all concerns. Otherwise, they make high-level assertions that interference risks can be managed easily or, remarkably, they simply ignore interference management concerns.[8] All too often, these commenters cite to DACA deployments in the military context to show proof of

[7] *See generally* Comments of CTIA–The Wireless Association® (filed Feb. 28, 2011); Comments of APCO (filed Feb. 28, 2011); Comments of AT&T (filed Feb. 28, 2011); Comments of NPSTC (filed Feb. 28, 2011); Comments of Rex Buddenberg (filed Feb. 28, 2011); Comments of SIA (filed Feb. 28, 2011); Comments of Sprint Nextel (filed Feb. 28, 2011).

[8] *See, e.g.,* Comments of Carolina Unmanned Vehicles Inc. (filed June 26, 2012) ("CUV Comments").

concept,[9] yet none provide adequate detail as to how these deployments account for interference risks to existing terrestrial networks in the same or adjacent spectrum.

xG Technology, Inc., for example, uses this proceeding to tout its cognitive radio system solution and proclaims that with an aerial deployment, "interference with existing licensed commercial and public safety spectrum is not a valid concern."[10] According to xG, with use of its xMax cognitive radio technology, "no frequency planning or use pattern is necessary prior to system deployment due to its ability to create its own RF plan in real time."[11] However, xG's claim is inconsistent with the recent Commission assessments of the technology. Following the National Broadband Plan,[12] the Commission launched a notice of inquiry proceeding on dynamic spectrum use seeking comment on issues such as cognitive radio.[13] The Commission acknowledged, with respect to many dynamic spectrum access proposals, that "further work is needed to show that the technology will function as intended under actual usage conditions in a broad array of radio environments without causing harmful interference to existing spectrum users."[14] To suggest that cognitive radio technology will solve all interference issues raised by aerial deployments that overlay existing licensed terrestrial networks in the aftermath of disasters

[9] *See, e.g.,* Comments of General Dynamics C4 Systems at 6-7 (filed July 25, 2012) ("General Dynamics Comments"); Comments of Oceus Networks at 2-3 (filed July 25, 2012) ("Oceus Comments"); Comments of Smartronix, Inc. at 2-3 (filed July 23, 2012); Comments of xG Technology, Inc. at 1-2 (filed July 25, 2012) ("xG Comments").

[10] xG Comments at 6. Further, xG states that "[t]here is *no* potential for harmful interference with the xMax system operating in the range of 300 MHz to 3 GHz, when the band map is set up properly." *Id.* at 7 (emphasis added).

[11] *Id.* at 4.

[12] FEDERAL COMMUNICATIONS COMMISSION, CONNECTING AMERICA: THE NATIONAL BROADBAND PLAN (2010).

[13] *See Promoting More Efficient Use of Spectrum Through Dynamic Spectrum Use Technologies*, Notice of Inquiry, ET Docket No. 10-237, 25 FCC Rcd 16632 (2010).

[14] *Id.* at 16639 ¶ 18.

where some but not all cell sites are disrupted is unproven, and nothing in the record demonstrates otherwise.

Other proponents acknowledge interference risks and assert they can be managed, but fail to offer any roadmap to avoid interference in a post-disaster radio environment where operations and restoration of service occur under fluid, dynamic circumstances. Oceus Networks, for example, asserts "it is [] reasonable *to assume* that DACA can leverage" existing mitigation techniques designed for "adjacent channel interference and co-channel interference at cell edges."[15] It calls for coordination but only to "provide assurances that the DACA network and the commercial network are operating under well known behaviors and both parties can modify their networks to ensure continued operations."[16]

Oceus Networks mistakenly assumes that outages are network-wide and restoration is a systematic, methodical process. In reality, as Sprint's description of operations in the aftermath of disaster reflects, "certain base stations do not function at all; other base stations are functioning, but at increased power to provided expanded, coverage-layer service to affected customers; and still other base stations are operating, but with lower signal strength, reduced backhaul capacity or other limitations that can impede coverage, connectivity or both."[17] Oceus offers no detail as to how co-channel mitigation techniques to address adjacent market interference would work when an aerial network with expansive coverage is overlaid atop a terrestrial network in which disabled sites may be very localized, some service is maintained, and cell sites resume operations spontaneously and automatically. As AT&T observed,

[15] Oceus Comments at 9-10 (emphasis added).

[16] *Id.* at 15.

[17] Sprint Comments at 5-6.

"[t]ransmissions from aerostats would propagate into areas where operational base stations are located, interfering with provider's attempts [sic] to restore network operations in disaster areas and interfering with continuing operations adjacent to the disaster areas. This interference risk cannot be eliminated."[18] Claims that DACA directional antennas can limit signals outside the area of interest are similarly unavailing,[19] as there is no evidence regarding protections afforded by antenna pattern – let alone how real-time coordination could occur as cell sites come back on line.

General Dynamics' purported solution to interference risk is to divide up a commercial licensee's spectrum between channels reserved for DACA and those reserved for commercial providers' restoration efforts.[20] While General Dynamics asserts that this "dedicated allocation" would be the "simplest approach for coordinating,"[21] this proposal represents a blunt instrument that would severely restrict the amount of spectrum and thus the amount of capacity available at the terrestrial network's operational sites and hamper restoration of a robust network. Further, this suggestion necessarily offers a backward-looking approach developed in a narrowband context, as it fails to account for today's wider band technologies such as LTE, which utilize the full extent of licensed bands be they 5 MHz, 10 MHz or wider.

[18] AT&T Comments at 2.

[19] Comments of Space Data Corporation at 21 (filed July 25, 2012) ("Space Data Comments").

[20] General Dynamics Comments at 9-10.

[21] *Id.* at 11.

Finally, SpaceData's suggestion that DACA operators scan frequencies for inactivity, then operate on unoccupied channels, and then later scan again, is rudimentary and does not constitute a viable real-time coordination regime.[22]

B. Any DACA Deployments on Licensed Spectrum Must Obtain Prior, Express Licensee Approval

In the event the Commission moves forward with further consideration of its DACA initiative, any DACA operations must obtain prior, express licensee approval. Any other approach[23] would threaten the underlying licensee's restoration efforts and continuation of services.[24]

Wireless providers have intimate knowledge of their networks and internal capabilities, and therefore are in the best position to make decisions regarding the choice of tools to restore or temporarily replace their networks in the event of outages.[25] Indeed, others in the docket recognize the necessity of express licensee authorization. APCO, for example, asserts that individual public safety agencies must have sole discretion as to whether and how to deploy DACA given the "far too substantial" danger of harmful interference.[26] Similarly, Globalstar "believes that any DACA or similar ground-based system should be licensed and operated *only with the full approval and cooperation of the existing commercial, public safety, and private*

[22] Space Data Comments at 19-20.

[23] *See, e.g.*, Oceus Comments at 16-17 (suggesting that the Commission adopt a DACA framework that would allow deployment on licensed spectrum while bypassing any licensee approval); xG Comments at 4 (same); General Dynamics Comments at 10 (same).

[24] *See* CTIA Comments at 7-9; Sprint Comments at 11; AT&T Comments at 2-3.

[25] CTIA Comments at 8.

[26] APCO Comments at 3.

wireless licensees whose bands will be utilized by these temporary operations."[27] In addition to interference concerns, licensees have "reasonable, investment-backed expectations in the exclusive use of [licensees'] licensed spectrum during the license term that the FCC should not lightly override."[28]

Accordingly, if DACA deployments occur on licensed spectrum, the Commission must ensure that licensees expressly approve such a solution prior to any such deployment.

C. Questions Remain Regarding DACA Efficiency

Many of the questions asked by the Commission, CTIA and others remain regarding the efficiency of deploying a temporary DACA operation in the aftermath of a disaster – even after three rounds of public comment, the FCC White Paper, and a public workshop. The record provides little support indicating that the benefits of DACA deployment would outweigh the costs in terms of resources (both personnel and financial) diverted from ongoing restoration efforts.[29] Indeed, carriers have considered DACA solutions for restoring their networks in the aftermath of disasters. However, they have determined that alternatives are preferable to integrating DACA technology into their existing networks.[30]

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[27] Comments of Globalstar, Inc. at 7 (filed July 25, 2012) (emphasis added); *see also* Space Data Comments at 19 (suggesting the use of certain channels "to coordinate the implementation of wider bandwidths for DACA use *under pre-arranged agreements between the responsible government agencies and spectrum licensees whether they are public licensees or commercial licensees*.") (emphasis added).

[28] Sprint Comments at 2.

[29] *See* CTIA Comments at 10 (The Commission "also should assess the industry and public safety resources and personnel that would be required to enable and coordinate a post-disaster DACA operation and consider whether the diversion of costs and personnel could delay other recovery and restoration efforts that could better serve wireless users.").

[30] *See* AT&T Comments at 5-7; Sprint Comments at 7-8; Comments of Telecommunications Industry Association at 8-9 (filed July 25, 2012).

Even as DACA proponents advocate DACA systems' expansive coverage,[31] they fail to address whether the limited capacity available in an aerial solution would soon be overwhelmed as users over a broader coverage area attempt to access the network.[32] As the Department of Defense representative at the FCC's DACA Workshop noted last year:

> [A]s you do [cellular] restoration from an aerial platform, you suddenly cause an exponential increase in the number of people that can see that airborne cell and we will run into the same kinds of problems that we did during Katrina where a cell tower will come back online and within a couple of minutes be so overrun by the demand of people that can see it, if you will, that the tower shut down again.[33]

Indeed, several DACA proponents acknowledge that a large footprint can be a drawback. For example, Space Data notes that "large footprints can sometimes be a detriment, particularly in scenarios when frequency reuse over broad geographic areas is a necessity."[34] Space Data refers to directional antennas as a way to help limit interference and allow spectrum to be reused more frequently; however the references offer no guidance as to an efficient frequency re-use plan.[35]

DACA proponents also do little to address the challenge of backhaul capacity inherent in an aerial deployment. Oceus simply observes, "[*a*]*ssuming* backhaul connectivity is provided," a DACA system interoperable with the public safety network could be deployed using existing

[31] General Dynamics Comments at 13; Oceus Comments at 5; xG at 7; CUV Comments at 2.

[32] *See* CTIA Comments at 10; AT&T Comments at 4-5, 8; *see also* Sprint Comments at 8-9.

[33] FCC, Workshop/Webinar on Deployable Aerial Communications (Oct. 31, 2011), remarks of Al Johnson, Director, Integrated Information and Communications Technology Support (IIS), Office of the Assistant Secretary of Defense Networks and Information Integration (NII), U.S. Department of Defense, Chief Information Officer, at http://www.fcc.gov/events/workshopwebinar-deployable-aerial-communications-architecture.

[34] *See, e.g.*, Space Data Comments at 21; *see also* General Dynamics Comments at 9.

[35] *See* Space Data Comments at 21-22.

aircraft fleets.[36] It does not, however, describe how such backhaul connectivity would be provided and how capacity requirements would be met. Similarly, General Dynamics acknowledges that an aerial base station would require a backhaul link, "utilizing other [General Dynamics] products," but never describes with specificity how backhaul would be provided and how such proprietary products operate.[37] xG merely asserts that its mobile systems with VSAT backhaul, on trailers, "have been successfully demonstrated," and that the system needs only a line-of-sight path to the VSAT or terrestrial system.[38] xG does not, however, account for the backhaul capacity that would be needed for the wide coverage area implicated by a DACA deployment. To address the backhaul issue, DACA proponents could consider repurposing their technologies to provide emergency aerial backhaul to link cell sites that are operational but have lost connectivity due to terrestrial wireline transport outages and out of service switches. Such deployments could utilize spectrum in other bands for this backhaul service and avoid interference with terrestrial users.

Other commenters raise new concerns regarding even a time-limited DACA deployment. For example, the National Academy of Sciences' Committee on Radio Frequencies suggests that "there may be a real danger of 'mission creep' in the deployment of DACA technologies…. In such cases, it may not be in the public interest to continue use of DACA technologies that cause interference to other uses such as radio astronomy."[39] The Committee seems to suggest that

[36] Oceus Comments at 6 (emphasis added).

[37] General Dynamics Comments at 4.

[38] xG Comments at 8.

[39] Comments of the National Academy of Sciences' Committee on Radio Frequencies at 6 (filed July 25, 2012).

withdrawing DACA deployments after services have been restored may not be as simple as DACA proponents have suggested.

In addition, with respect to DACA operations on commercial spectrum, the record provides little insight into the substantial costs that AT&T noted "would be incurred in keeping the aerostats maintained and upgraded to supplement ever-evolving commercial networks…."[40] Given the need to continuously upgrade the DACA payloads to maintain pace and ensure compatibility with the technological developments of commercial networks, DACA deployments could reflect an astronomical cost per actual use.

Finally, while there is some discussion of DACA deployment for wireless priority service ("WPS") or E-911, there is no evidence that an aerial overlay network could handle these responsibilities. As Sprint details, the aggregated traffic from a DACA cell site repeater could extend the WPS queue time to much greater than the general thirty seconds and thus prevent priority calls from going through.[41] In addition, a DACA system may be unable to route and deliver 9-1-1 traffic to the appropriate PSAP.[42]

DACA proponents fail to address these issues that are critical to the efficacy of a post-disaster DACA solution.

IV. THE RECORD LARGELY REFLECTS DACA AS A POTENTIAL OVERLAY TO PUBLIC SAFETY NETWORKS AND FUTURE DACA REVIEW SHOULD BE LIMITED TO PUBLIC SAFETY

Commercial carriers have made clear that they have significant concerns with any deployment of DACA on commercial spectrum. As noted, carriers have considered DACA

[40] AT&T Comments at 3.

[41] Sprint Comments at 9.

[42] *See id.*

solutions and have ultimately determined that other methods are preferable to restore commercial service after a disaster. Indeed, even DACA proponents largely focus their attention on public safety spectrum and operations.[43] Given the significant complexities involved in any DACA deployments on commercial spectrum, the Commission should abandon any further exploration of temporary DACA deployment. If the Commission does proceed, the Commission should clarify that any further consideration of temporary DACA deployment in the aftermath of disasters will focus on supplementing public safety networks. Should the Commission wish to continue its exploration of DACA, such an approach would allow the Commission and interested parties to pare down the issues to be reviewed and begin a focused evaluation of whether, and under what circumstances, DACA would be a proper post-disaster solution for public safety operations on public safety spectrum.

V. CONCLUSION

The record reflects continued significant and unresolved interference and efficiency concerns associated with any DACA deployment on commercial spectrum. Accordingly, if the

[43] *See* CUV Comments at 11; General Dynamics Comments at 6, 9; Oceus Comments at 2, 11; Space Data Comments at 18-19; Comments of Unmanned Aviation Public Safety Association at 9-10 (filed July 25, 2012); xG Comments at 9.

Commission nevertheless decides to further pursue an environment wherein DACA solutions may be deployed, it should limit future consideration to supplementing public safety networks.

Respectfully submitted,

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